香港浸會大學
HONG KONG BAPTIST UNIVERSITY

School of 中醫藥學院
Chinese Medicine

Self-assembled polymeric nanoparticles – from competitive kinetics to biomedical applications

Dr. LIU Ying

Associate Professor

Dept. of Chemical Engineering, University of Illinois at Chicago

Date	:	20 December 2018 (Thu)
Time	:	2:00 pm – 3:00 pm
Venue	:	SCM 809
Language	:	English
Facilitator	:	Prof. Lyu Aiping

Abstract

The Liu research group employs state-of-the-art technologies to measure macromolecule self-assembly kinetics with millisecond temporal and micrometer spatial resolutions, which are essential for rational design and development of advanced drug delivery platform with well-controlled nanostructures. Based on understanding the assembly kinetics, the Liu research group has developed scalable, continuous processes to reproducibly generate drug-delivery particles. Two types of particles – polymeric nanoparticles and toroidal-spiral particles (TSPs) will be presented.

Manipulating non-equilibrium structures of the polymeric nanoparticles to achieve high drug loading is through kinetic control by a sophisticated combination of mixing and spray drying. We combined experimental and simulation tools to elucidate the self-assembly kinetics of polymeric micelles that control pharmaceutical nanoparticle physicochemical properties. Applications of these nanoparticles for targeting delivery and sustained release of hydrophobic drug compounds will be demonstrated.

During sedimentation in a miscible, viscous liquid, polymeric drops self-assemble into a reproducible toroidal-spiral shape, which could be solidified into solid particles by various means of polymer cross-linking. TSPs can be used as versatile carriers to deliver a combination of therapeutic agents of different sizes and manipulate individual drug release to reach best drug synergy for the treatment of complex diseases. Moreover, TSPs could also be used to encapsulate therapeutic cells for cell protection, local stimulation, and release.

~ All are welcome ~